Oct. 26, 1937. G. BRAIN ET AL 2,097,174

BUILT-IN EVACUATOR

Filed July 16, 1936

Fig. 2.

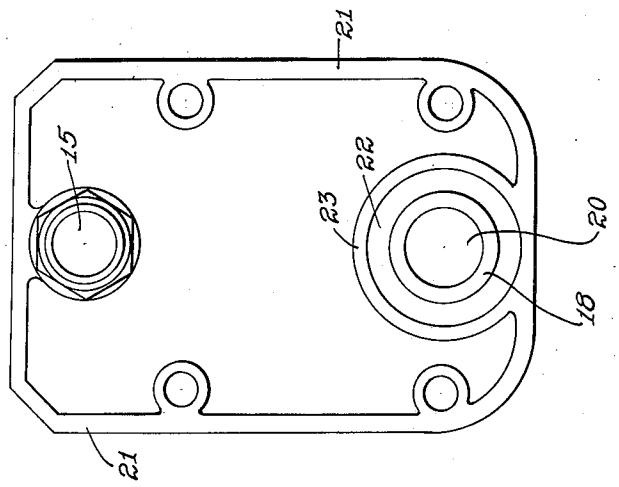
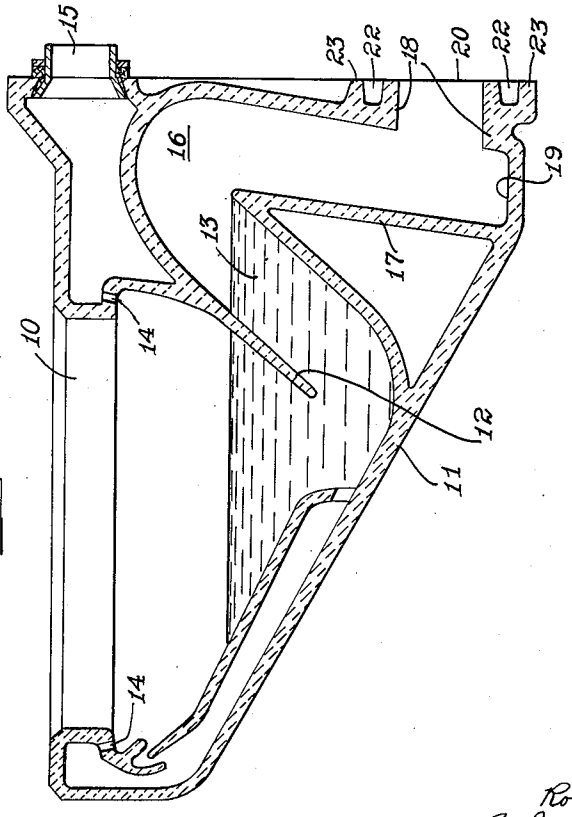


Fig. 1.



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BUILT-IN EVACUATOR

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Application July 16, 1936, Serial No. 90,880

6 Claims. (Cl. 4—69)

Our present invention relates to a water closet having a self-contained built-in evacuating system.

In application Serial No. 75,573, filed by Robert C. Boyd on April 21, 1936, there have been set forth some of the difficulties previously encountered in connection with the syphon system of a water closet evacuator, and in that application there is disclosed and claimed a construction designed to overcome those hitherto accepted defects of the prior art constructions.

The present invention makes use of the same general principles which are set forth in the aforesaid application but in this invention the evacuator has been incorporated integrally with the closet; e. g., in a wall hung closet. In other words, the evacuator system and the syphon down-leg are cast integrally with the remainder of the closet construction.

In evacuators of the type here involved, in order to obtain proper syphonic action, it is essential that a certain retardation of the flow of flushing water be effected so as to make possible the initiation of syphonic action. This flow retardation has heretofore been brought about by so constructing the syphon down-leg or the evacuating system as a whole that the water passage was provided with flow impeding constrictions, bends or dams. As pointed out in the aforesaid application, however, such do not give the desired results efficiently not only because the flushing action loses in vigor but because such arrangements are apt to become clogged with waste matter due to restrictions, bends, etc. where clogging tendencies would arise.

It is accordingly one of the objects of the present invention to produce a closet with a built-in evacuator system which shall be free from the defects and disadvantages of previously used constructions and which shall have new and useful features of construction and operation.

It is another object of our invention to provide a simple but highly effective evacuator system integral with a closet construction and characterized by the fact that it will operate with a minimum quantity of water and will be substantially free from clogging tendencies.

Other and further objects and advantages will be understood from the following description or will be pointed out hereinafter.

In the accompanying drawing:

Figure 1 is a vertical section taken through a closet embodying the present invention, and

Figure 2 represents a rear elevational view of the closet.

Like numerals designate corresponding parts throughout the various views.

The closet construction illustrated in the drawing is composed of a vitreous material, such as vitreous china which may be cast or formed in any desired or suitable manner but wherein the molds in which the casting is made are so configured as to provide a built-in evacuator system, as will be apparent from Figure 1 in particular.

The closet has a hollow rim 10 and a bowl portion 11, configured as shown, although it is to be understood that we are not limited to a closet constructed exactly like that illustrated. The bowl portion is provided with a seal wall 12 which defines the seal passage 13. Normally water stands within the bowl to the level shown and the water enters the bowl in the usual manner through a plurality of apertures 14 in the under side of the hollow rim into which water is admitted by the inlet member 15 which is connected to a suitable source of water, such as a tank or the like, not shown.

The seal passage 13 merges into a curved semicircular passage 16 which in turn leads to a substantially vertical down-leg portion 17, which, as will be observed, is free from any internal irregularities, i. e., is free from bends, dams and constrictions. At the bottom, the down-leg terminates in a right-angled portion 18 which is provided with a somewhat dished surface 19 disposed normally to the direction of flow of the water in the down-leg. This surface 19 results in imparting a momentary recoil to a column of water falling through the down-leg at the commencement of the flushing action as the first portion of the water spills over into the down-leg due to the rise in the level of the water in the bowl. This recoil lasts only long enough to permit the down-leg to fill completely with water and thus to insure self-maintenance of the syphonic action throughout the balance of the flushing operation.

We wish particularly to point out that the column of water falling through the down-leg is not thrust toward the discharge opening 20 of the down-leg but the surface 19 acts to reverse the direction of flow of the water or to reduce its velocity temporarily to zero and it is this momentary recoil or velocity reduction which enables the down-leg to fill and hence the syphonic action to be self-sustaining until the entire charge of flushing water has been utilized. We wish also to point out that surface 19, even though it is dished somewhat below the level of the discharge orifice 20, is self-scouring and careful tests have conclusively proved that this surface does not constitute a point of lodgment of waste matter.

As pointed out in the above referred to application, the down-leg 17 may be slightly tapered from a point adjacent the elbow portion 16 to a point above but adjacent to the discharge orifice 20. We are not limited to a down-leg which is absolutely vertical or very close thereto because we have found that it is also possible to have the down-leg slightly inclined and such an arrangement has been shown in Figure 1.

The discharge orifice 20 of the evacuator system is of course connected to a soil pipe (not shown) for suitable discharge purposes and at the inlet connection 15 there is likewise a suitable pipe connection leading to the water supply. These accessories are standard equipment and hence have not been illustrated or described in detail.

By our present invention we are enabled to incorporate in any suitable closet bowl of the general type shown an evacuator system which is simple and extremely effective and which will operate with a practical minimum amount of water. By utilizing a slight taper toward the bottom of the down-leg, we are enabled to operate the evacuator with an absolute minimum amount of water and this is sometimes important where water is relatively scarce or expensive or for other reasons.

It is apparent that the first increase in water in the bowl causes the water level to rise sufficiently high to effect the spilling of water into the down-leg and when this water strikes or impinges against the surface 19 it is momentarily retarded long enough to cause the down-leg to become entirely filled with water; then the effect of the recoil disappears and the syphonic action becomes self-sustaining throughout the balance of the flushing operation.

The closet is provided with a suitable base or flange 21 by means of which it may be mounted on a wall or the like. Annular groove 22 and flange 23 enable a water-tight soil pipe connection to be made. As will be clear from the foregoing our invention may be utilized in connection with various types and shapes of closets, the construction shown in the drawing being merely illustrative of one form of closet to which our invention is applicable.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is:

1. A water closet comprising a bowl, a seal wall projecting into said bowl and forming with the rear of the bowl a seal passage, a substantially vertical, internally un-restricted down-leg integral with said bowl and communicating with said seal passage by a curved elbow, a flat surface constituting the bottom of the down-leg and being perpendicularly disposed to the longitudinal axis of the down-leg, and a discharge opening in the side of the down-leg near the bottom thereof but above the flat surface aforesaid and the axis of which is also perpendicular to said down-leg axis.

2. A water closet comprising a hollow rim having a water inlet and water distributing apertures, a bowl adapted to receive water from the rim apertures, a seal wall projecting into said bowl and forming between it and the rear of the bowl a seal passage, a substantially vertical, internally unrestricted down-leg integral with the bowl and communicating with the seal passage by a curved elbow, a flat surface perpendicular to the longitudinal axis of the down-leg and forming the bottom thereof and a discharge opening in said down-leg near the bottom thereof but above said flat surface, the effective unobstructed water passage area of which is substantially equal to the full area of such opening.

3. A water closet comprising a bowl, a seal wall projecting into said bowl and forming with the rear of the bowl a seal passage, a down-leg integral with said bowl and communicating with said seal passage by a curved elbow and characterized by the fact that it is substantially vertically disposed, is internally unrestricted and terminates in a flat surface disposed perpendicularly to the longitudinal axis of the down-leg and a discharge opening in the side of the down-leg near the bottom thereof but above the flat surface aforesaid, said discharge opening being characterized by straight cylindrical walls communicating with the down-leg substantially at right angles thereto.

4. A water closet comprising a hollow rim having a water inlet and water distributing apertures, a bowl adapted to receive water from the rim apertures, a seal wall projecting into said bowl and forming between it and the rear of the bowl a seal passage, a down-leg integral with the bowl and communicating with the seal passage by a curved elbow and characterized by the fact that it is disposed substantially vertically, is internally unrestricted and free from directional changes and terminates in a flat dished surface perpendicular to the longitudinal axis of the down-leg, said flat surface being characterized by the fact that water traversing the down-leg impinges thereagainst without change in direction and has an area substantially equal to the cross-sectional area of said down-leg and a discharge opening in the side of the down-leg near the bottom thereof but above the flat surface aforesaid, said discharge opening being characterized by the fact that its wall surface is straight and cylindrical, it communicates directly with the down-leg above the flat surface aforesaid and is structurally connected to said down-leg substantially at right angles thereto.

5. In a water closet of the kind described, a down-leg, a flat surface constituting the bottom of said down-leg and a discharge opening in the side of said down-leg near the bottom thereof but above the flat surface aforesaid, the construction and arrangement being such that the down-leg is substantially vertically disposed, is internally unrestricted and free from directional changes, the flat surface is below the discharge opening and has approximately the same area as the down-leg itself and the discharge opening is formed by straight cylindrical walls which communicate directly with said down-leg free from obstructing parts where they join said down-leg.

6. In a water closet of the character described, a down-leg, a flat surface perpendicular to the longitudinal axis of said down-leg and forming the bottom thereof and a discharge opening in the side of said down-leg near the bottom thereof but above the flat surface aforesaid, the construction and arrangement being such that the down-leg is substantially vertically disposed, is internally unrestricted, and is free from directional changes, the flat surface has an area substantially equal to and co-extensive with the cross-sectional area of said down-leg and said discharge opening is formed by smooth straight cylindrical walls communicating directly with said down-leg as aforesaid, the discharge opening being connected to said down-leg by substantially right angled walls and being free from flow-impeding obstructions.

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